OIL COOLER STRUCTURE OF AN AUTOMATIC TRANSMISSION

CROSS-REFERENCE TO RELATED APPLICATIONS

[001] This application claims priority to Korean Application No. 10-2003-0079020, filed on November 10, 2003, the disclosure of which is incorporated fully herein by reference.

FIELD OF THE INVENTION

[002] The present invention relates to an oil cooler structure of an automatic transmission and, more particularly, to an oil cooler structure of an automatic transmission adapted to prevent assembly deviation between an upper tube plate and a lower tube plate and to improve an entire durability thereof.

BACKGROUND OF THE INVENTION

[003] An oil cooler is disposed with an upper tube plate and a lower tube plate, each overlapped and welded thereto, to form one plated tube. Generally five to six plated tubes are layered to constitute an oil cooler.

[004] An uppermost plated tube forming an oil cooler is disposed at both distal ends thereof with a pair of nipples for circulating oil. The upper tube plate and the lower tube plate, for forming each plated tube, are respectively mounted with oil holes for communicating with the nipples. Embossed parts are respectively formed at a central area of a plane near the oil holes. The embossed parts function to connect an upper tube plate and a lower tube plate and are coupled by braze welding. Furthermore, the embossed parts also serve to prevent a detachment of assembling positions when inner cooling pins are assembled and also serve to maintain a rigidity of plated tubes at an area where there are no inner cooling pins.

SUMMARY OF THE INVENTION

[005] The present invention provides an oil cooler structure of an automatic transmission wherein a reinforced plate equipped with embossed parts is separately manufactured and the plate is integrally coupled to an upper tube plate and a lower tube plate by way of braze welding to thereby prevent an assembling deviation between the upper tube plate and the lower tube plate, and to allow the embossed parts to be welded via a broad area, thereby increasing the entire durability thereof.

[006] In accordance with a preferred embodiment of the present invention, the oil cooler structure of an automatic transmission comprises an upper tube plate reinforcement and a lower tube plate reinforcement each arranged in a layer in an oil passage formed between a plane of an upper tube plate and a plane of a lower tube plate and respectively welded to the upper tube plate and the lower tube plate and embossed parts thereof protruding toward the center of the oil passage being mutually abutted and welded therebetween.

BRIEF DESCRIPTION OF THE DRAWINGS

[007] For a better understanding of the nature and objects of the present invention, reference should be made to the following detailed description with the accompanying drawings, in which:

[008] FIG. 1 is a perspective view illustrating a partially cut-out oil cooler in an oil cooler structure of an automatic transmission according to an embodiment of the present invention;

[009] FIG. 2 illustrates essential parts of FIG. 1,

[0010] FIG. 3 is a schematic drawing for explaining a structure of upper and lower tube plate reinforcements according to an embodiment of the present invention; and

[0011] FIG. 4 is a cross-sectional view taken along a crosswise direction of a plate tube in an oil cooler.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0012] The preferred embodiment of the present invention will now be described in detail with reference to the accompanying drawings. The present embodiment should not limit the scope of the present invention and is described only for illustrative purpose.

[0013] As shown in FIG. 1, an upper tube plate 11 and a lower tube plate 13 are overlapped and welded to form one plated tube 10. A plurality of plated tubes 10 are layered and welded to constitute an oil cooler. Oil holes 11a and 13a formed at the upper tube plate 11 and the lower tube plate 13a form a space for oil to circulate therein by way of the layered plurality of plated tubes 10, and the space is connected to an automatic transmission through nipples (not shown).

[0014] An oil passage 21 is disposed with an aluminum upper tube plate reinforcement 51 and an aluminum lower tube plate reinforcement 53, as depicted in FIGS. 1 to 4, and is arranged along a width of plane parts 11b and 13b and welded to the upper and lower tube plates 11 and 13 by way of braze welding.

[0015] The upper and lower tube plate reinforcements 51 and 53 include welded coupling surfaces 51a and 53a respectively abutted and welded to surfaces of the plane parts 11b and 13b extended from the oil holes 11a and 13a, and embossed parts 51b and 53b protruding from a central portion of the welded coupling surfaces 51a and 53a and

distanced from the plane parts 11b and 13b and protruding toward a center of the oil passage 21. The embossed parts 51b and 53b of the upper and lower tube plate reinforcements 51 and 53 are mutually abutted at distal ends thereof and coupled by braze welding.

[0016] One marginal surface of the upper and lower tube plate reinforcements is arched to conform to part of the oil holes 11a and 13a of the upper and lower tube plates 11 and 13, and other three marginal surfaces thereof are straightly formed along longitudinal and cross-wise directions of the plane parts 11b and 13b.

[0017] Preferably, the embossed parts 51b and 53b formed at the upper and lower tube plate reinforcements are straight plane parts having a length of 3.0mm to 5.0mm along a longitudinal (L) direction of the upper and lower tube plate reinforcements 51 and 53, and more preferably having a length of 4.0mm.

[0018] By way of reference, the entire length of the upper and lower tube plate reinforcements 51 and 53 depends on a width (D1 and D2) of the plane parts 11b and 13b, but usually has a length of approximately 25.00mm.

[0019] Preferably, the width (D1 and D2) length of the plane parts 11b and 13b is 2.9mm. Furthermore, the embossed parts 51b and 53b and the welded coupling surfaces 51a and 53a are connected via slopes 51c and 53c each having a prescribed angle. The slopes 51c and 53b may respectively be formed in a straight plane shape or in an arched shape.

[0020] The thickness (t) of the upper and lower tube plate reinforcements 51 and 53 is formed to have 0.2 times of a gap (M) between inner surfaces of the plane parts 11b and 13b. In other words, the gap (M) between the inner surfaces of the plane parts 11b and 13b is 3.0mm, and each thickness (t) of the upper and lower tube plate reinforcements 51 and 53 is formed to have 0.6mm. As a result, a space of 1.8mm is

formed between the welded coupling surfaces 51a and 53a of the upper and lower tube plate reinforcements 51 and 53.

[0021] The upper and lower tube plate reinforcements 51 and 53 connect the upper and lower tube plates 11 and 13 via the embossed parts 51b and 53b to carry out the function of maintaining the rigidity of the plated tubes 10, and simultaneously carry out a function of preventing detachment of assembling positions of inner cooling pins (not shown) when the inner cooling pins are assembled.

[0022] Meanwhile, the upper tube plate 11, the lower tube plate 13 and the upper and lower tube plate reinforcements 51 and 53 are all made of aluminum thin plates via pressing process, and the upper tube plate 11 and the lower tube plate 13 are integrally formed with the oil holes 11a and 13a when they are pressed for forming.

[0023] In the oil cooler structure according to the present invention, the upper and lower tube plate reinforcements 51 and 53 equipped with protruding embossed parts 51b and 53b, each having a sufficient area, are separately manufactured to be respectively coupled to the upper and lower tube plates 11 and 13 by way of a braze welding method. This prevents a decrease in rigidity and durability of an oil cooler, where these decreases are generated by insufficient protruding areas of embossed parts, and shrunken local surfaces of upper and lower tube plates generated by the embossed parts being integrally pressed to the embossed parts can be prevented. As a result, the durability of an oil cooler can be increased across the board.

[0024] As apparent from the foregoing, there are advantages in the oil cooler structure of an automatic transmission thus described according to the embodiment of the present invention in that upper and lower tube plate reinforcements equipped with protruding embossed parts each having a sufficient area are separately manufactured to be respectively coupled to the upper and lower tube plates by way of a braze welding

method. A decrease in rigidity and durability of an oil cooler can be prevented, where these decreases are generated by insufficient protruding areas of embossed parts, and shrunken local surfaces of upper and lower tube plates generated by the embossed parts being integrally pressed to the embossed parts can be prevented. The durability of an oil cooler can be increased across the board.